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Title:

Sequential Monte Carlo calibration of NUCOM-Bog on multiple peatlands

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Abstract: (Your abstract must use **Normal style** and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text/diagrams into it.)

Preparation of Your Abstract

1. The title should be as brief as possible but long enough to indicate clearly the nature of the study. Capitalise the first letter of the first word ONLY (place names excluded). No full stop at the end.
2. Abstracts should state briefly and clearly the purpose, methods, results and conclusions of the work.
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Methods: Describe your selection of observations or experimental subjects clearly
Results: Present your results in a logical sequence in text, tables and illustrations
Discussion: Emphasize new and important aspects of the study and conclusions that are drawn from them

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Peatlands store a vast amount of carbon in their soil. With climate change, the stability of these carbon pools is under threat. Peatlands are mainly located in the northern hemisphere and can occur in different forms (e.g. bogs and fens). Their differences in hydrology lead to different types of peatlands and to a different carbon balance of the ecosystem. In this study we calibrate the NUCOM-Bog model (Heijmans et al., 2008) on an Atlantic blanket bog (Glencar, Ireland) and a raised bog (Mer Bleue, Canada), which differ in hydrology, climatic conditions, water table depth, vegetation and chemical status. NUCOM-Bog is a model that simulates NUtrient cycling and COMpetition for 5 plant functional types (PFT): graminoids, shrubs, hummock, lawn and hollow mosses in peatlands/bogs with a monthly time step. The model simulates the biomass of each PFT, the total net ecosystem exchange and the water table.
For the model calibration, a Sequential Monte Carlo (SMC) technique was used. The SMC is a Bayesian technique that draws parameter values from probability distributions to find their optimum values and their uncertainties. Its strength is its efficiency when parallelized on large computer clusters.
The model was calibrated against monthly averages of continuously measured water table depth and against NEE measured by eddy covariance systems for a 10 to 12 year period depending on the site. For both sites, the model was able to simulate the water table depth dynamics, but underestimated the measured values of NEE. Further investigation of the results is needed to identify the source of the mismatch for NEE and more sites need to be implemented.
We conclude that calibration is a useful tool to highlight model discrepancies, and also to use models for inferring functional differences across ecosystems.